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# Architectures of participation and emergent forms of inter-organisational activity: A preliminary analysis

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# ARE "DESIGN NETWORKS" SHAPED BY THEIR OWN OUTCOMES? COORDINATION PROCESSES BETWEEN ACTORS AND ARTEFACTS

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## Abstract

*This paper sets the basis for a research project focused on collaborative social network's genesis and dynamics. It introduces a research framework for the empirical investigation of a network focused on the design of a shared artefact, the so-called "Web services Architecture". Our hypothesis is that network artefact's characteristics, seen as the final outcome of a collaborative process, influence and drive the genesis and the structure of the social network that is designing it. We embraced this view in order to avoid a limitation of the traditional perspectives that consider the network structure as exogenous and stable. We consider the reciprocal influence between the artefact and the social network structure, with a phase in which the desired artefact may shape the network genesis and a phase in which the emergent network's structure may drive the artefact design.*

*Keywords: social network genesis and dynamics, design network, Web services, coordination, boundary object*

# 1 INTRODUCTION

This paper sets the basis for a research project focused on collaborative social network's genesis and dynamics. This work aims at the empirical investigation of a social network collaborating in the design of a shared artefact, the so-called "Web services Architecture" (WsA).

We named "design networks" those social networks that exist in order to design an artefact, like technical standards or open source software. We are interested in verifying whether the characteristics of the network artefact, seen as the final outcome of a collaborative process, may influence the genesis and the structure of the design network that is producing it. The traditional causal relationship between network structure (often seen as the independent variable) and network outcome (often seen as dependent variable) may be reversed in design networks: in our case, the (desired) characteristics of the artefact (WsA) may influence the genesis, the structure and the activities of the collaborative network. We therefore hypothesize that one important factor in the genesis of a design network is its fit with the designed outcome (i.e. the network artefact). If our intuition is correct, there could be situations in which the process of design a specific object (with certain characteristics) rather than another one (with different characteristics) shapes and influences the genesis and the dynamics of the social network committed to design the artefact.

The network artefact here investigated is the WsA, a rapidly emerging standard architecture recently defined by the W3C standardization consortium for distributed componentized software applications over the Web (Alonso et al. 2003). The WsA is a set of guidelines enabling any system to remotely access and use software components as "Web services". The "Web services" concept is a relevant innovation, attracting significant investments in the software industry. The use of the Web services makes it possible to assemble a software application with several independent parts (software components), each accessible over the Web. Using Web services, programmers can compose a "virtual" software application like a puzzle, by accessing the different pieces (Web services) over the Web, independently of their physical location. In principle, many different (and incompatible) implementations of Web services may be possible: standardized architectural guidelines are therefore crucial to ensure true compatibility and interoperability of systems based on Web services by different vendors.

Within the W3C consortium, more than 40 different companies all over the world collaborated for a two-year period toward the definition of this artefact, with weekly teleconference meetings, mailing lists and conferences. The company experts collaborated not only to harmonize different technical specifications, but also to actually face difficult technical issues including not only compatibility, but also security, privacy and reliability of the overall system. The entire standardization process is therefore in the same time a negotiation process (aiming at finding a common definition) and a design process (aiming at solving complex technical issues and devising innovative use scenarios).

With the help of social network analysis techniques and tools, we are here interested in exploring the complex web of network relationships between the actors during negotiation and design of the artefact "WsA". More specifically, we are interested in verifying whether the characteristics of the final outcome of the collaborative process, may actually influence the structure of the network that is producing it.

In comparison with the mainstream literature on social network analysis, this study has two main peculiarities: 1) it is focused on design networks, i.e. social networks aimed at the production of an artefact like open source software or standard technical specifications; 2) it is investigating the influence that the network outcome could have on the network genesis and structure (and not only the opposite relationship as traditionally analyzed by literature).

## 2 THEORETICAL BACKGROUND AND CONTRIBUTION

Traditional social network analysis (SNA) was originated in Social Psychology, and then applied to several different fields and levels of analysis, including for example inter-firm relationships, using categories and concepts like centrality, structural equivalence and clique analysis (Grandori & Soda 1995). Typically, SNA investigates how the characteristics and the structure of the network may influence the organizational or economic outcomes. For example, some organizational studies discuss the role of relationships in generating innovation (Ahuja 2000) and competitive advantage in markets (Gulati, Nohria, & Zaheer 2000); others focus on the influence of social networks on knowledge creators and spreaders (Singh 2005). In Granovetter's works (Granovetter 2005;Granovetter 1973) a thorough analysis is proposed on social networks, and why and how they may influence economic outcomes like hiring, prices, productivity and innovation. The same interest emerges from several economic studies, both theoretical, like (Rees 1966) and (Montgomery 1991), and empirical, like (Calvo-Armengol & Jackson 2004), showing the effects of social networks on employment and wage inequality or (Rauch 2001), discussing the role of social and economic networks in international trade. We recognize that the traditional perspective *network structure drives outcome* is crucial for the understanding of the network relevance and effects, but we also suggest that – particularly in design networks - the outcome itself (i.e. the artefact) may play a key role for the emergence and the genesis of the network structure of a successful collaborative project.

The debate about the endogenous or exogenous nature of the changes in the structural network's characteristics is still open. The attention of the researchers have been captured by the intangible aspect of the relationships between nodes and had not investigated any influence that the object itself, often only considered as the results of the network activities, could have on the network dynamics. Instead, our perspective, though recognizing the influence of the network structure on the outcomes, is based on the idea that the network artefact can influence the network genesis and dynamics, especially for creative design activities. This approach not only aims at throwing new light on antecedents of social network emergence and dynamics (Carugati & Bolici, 2006; Virili 2003); it is also an answer to a call for more research focusing on IT artefacts and on their direct influence on organizational processes (Orlikowski & Iacono 2001).

In order to give a contribution to this emergent research area, we will address the following research question: does the desired outcome of a specific design project (i.e. the artefact) influence the genesis and the structural characteristics of the network? In particular, we are asking: how do the characteristics of the artefact influence the design process? How do they eventually shape the actors positions, roles and relationships in the network? Answering to these questions would mean not only showing how the artefact could shape network structure and dynamics, but also covering some ground towards showing how the artefact itself may play a crucial and central role in the overall coordination of the design process.

The contribution of this research work is thus twofold: it shows the role of the working standard definitions (the social network outcome) in influencing the genesis and structure of a design network; it sets an empirical ground for further analysis of artefact-centered coordination processes in design networks.

## 3 METHODOLOGICAL SET-UP

In the W3C consortium, there is an "activity" for each technology being standardized. For each activity there may be several workings groups, each one focused on the production of a technical specification. Our analysis is focused on the WsA Working Group, which has the objective to define the technical specifications of a standard architecture for the Web services activity. Every working group has one or two leaders. There are two modalities of interaction: mailing list or group meetings -- they can be either face to face (F2F) or distributed (technology mediated)--. The charter document specifies that "to be effective every working group should have from 10 to 15 active participants". The F2F meetings don't have a predetermined frequency; they are settled by the group leader according to the matters to be treated, to the deadlines and the opportunities of co-location of side events (e.g. conferences, other W3C meetings). The distributed meetings are scheduled at least once a week (twice when required by the deadlines). The participation to the F2F meetings is limited, on invitation of the group leader. Guests or external experts may be occasionally invited.

# 4 DATA SET DESCRIPTION

All these forms of discussion and negotiation (mailing list, F2F meetings and teleconferences) are recorded, and the scripts are publicly accessible via the working group Web site. This collection of documents, eventually integrated with external information sources like specialized press articles and news, is illustrated in Fig. 1 here below. All the teleconference scripts and the public mailing lists are available for analysis on the W3C web site.

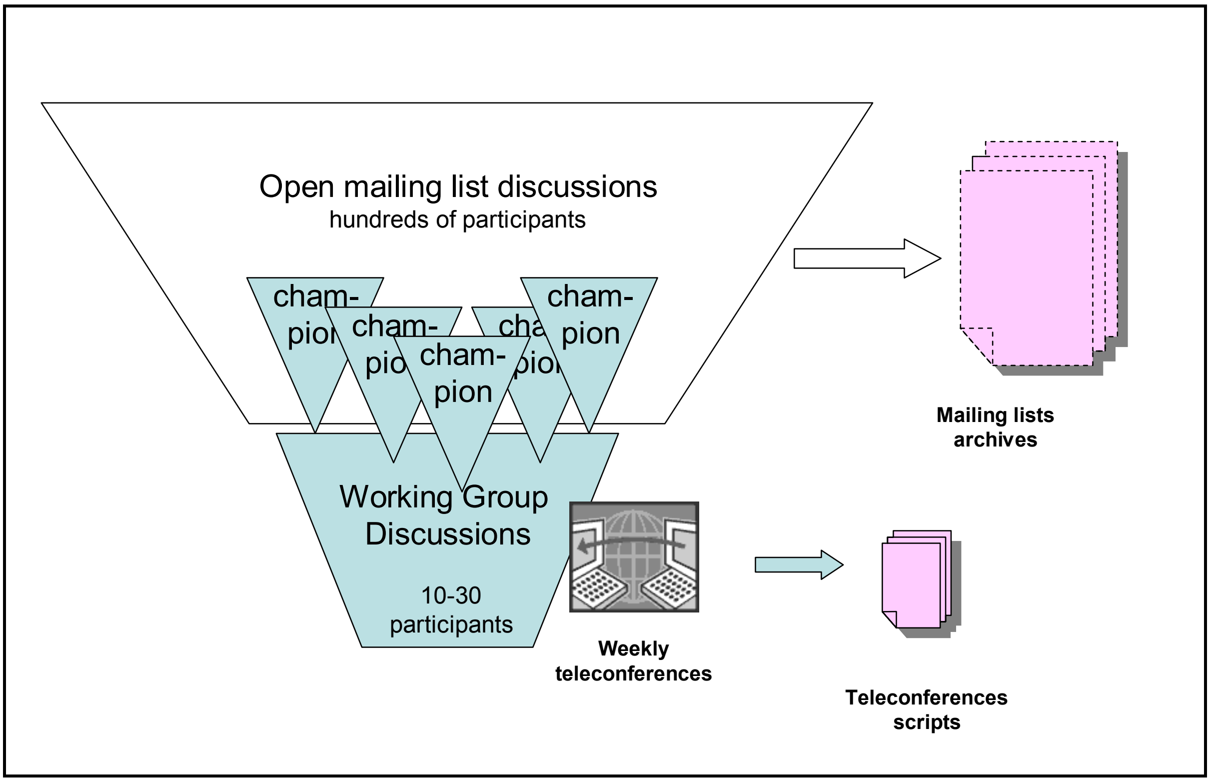


***Fig. 1.*** *Structure of the design process and – on the right – the empirical traces left.*

The available data sources for the WSA activity are: deliverables, meeting records, mailing lists and the external sources (like technical magazines and newspapers). The published deliverables include: the WS Architecture and the supporting documents (requirements, glossary, usage scenarios, service life cycle, and ontology). For each document all the previously published releases are accessible, together with the list of the modification intervened. For example, the first official version of the Web services architecture was published in November 2002, followed by two major updates in May 2003 and February 2004. The editor copies are also available: the first editor copy of the Web services architecture is dated June 2002, and was followed by updates in August 2002, March 2003 and July 2003. There are about fifty meeting records per year (on average the meetings were held once a week); they are usually written or edited by a scriber nominated for each session. The working group mailing list, during the period from February 2002 to February 2004 (25 months), collected 6895 messages, with an average of about 276 messages per month. The two “hottest” months were July 2002 (546 messages) and January 2003 (516 messages); the “coldest” were November and December 2003 (32 and 86 messages, respectively). Moreover, the working group created two temporary task forces that produced proposals on specific issues. The Management task forces produced four deliverables; the Security task force produced one deliverable. The task forces mailing lists are also available for consultation.

### 4.1 Exploratory data analysis

The strategy for initial data analysis was the following: 1) selection of an appropriate data sample for text analysis; 2) exploratory analysis of the relationship network-artefact, based on initial text labeling.

*1) Sampling* - The document sample initially selected for this preliminary analysis, was formed by the weekly teleconference scripts for the first year of activity of the working group. It is about 45 scripts, dating from February to December 2002, representing about half of the whole standardization period, focusing on the initial phases design giving birth to the first four drafts of the standard architecture. At the end of this year the standard was already at an advanced stage of design.

*2) Labelling and first exploration of the meeting notes-* The very first information we looked for was about text size and text authorship for the discussions documented in the scripts. To this aim we had to label more than 4.500 text passages, assigning an author name to each of them. The textual labelling was done with the software “NVivo” version 2.0 (Gibbs 2002).

Text size can be measured as number of text passages, or as number of characters, words, etc. The distribution along time of text sizes, measured as number of text passages is shown in Fig. 2 below.

The graph illustrates the evolution over time of the textual discussion reported in the scripts of the weekly teleconferences and of the four face to face (F2F) workshops in April, June, September and November. The four peaks of the F2F meetings are due not only to the higher number of participants, but also to the length of the conferences (2-3 days of a F2F conference against 1-2 hours of a teleconference). Moreover, considering the distribution of the authorship in the sample data set, grouped per company, it is quite evident that some companies (and some subject) like Sun (26% of total communication) or WW Grainger (11%), participated in the process much more intensively than others, like Oracle (4%) or Chevron (5%).

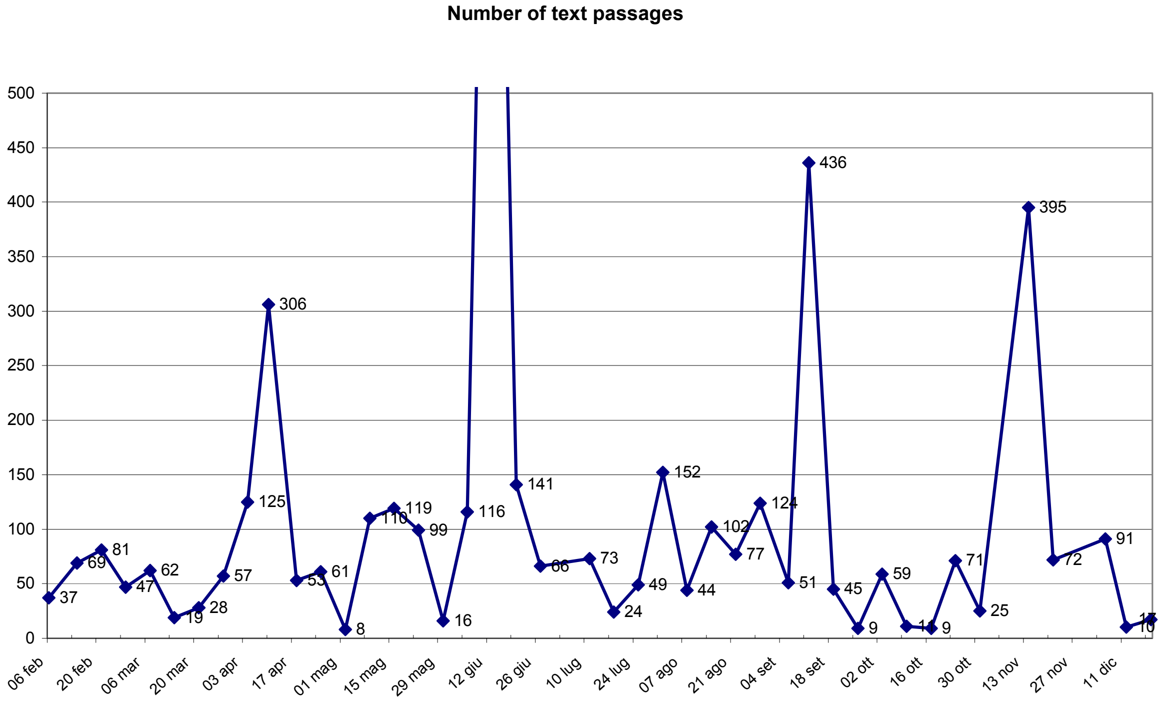


***Fig. 2.*** *Number of text passages for teleconferences and face to face (F2F) workshops (2002).*

*3) Mail selection* - In order to have different data sources we also investigated the mailing lists coordinated by the W3C consortium and open to discussion with the public. Thus we analyzed all the emails exchanged between Feb. and Dec. 2002. Moreover we decided to group by the emails along the same time scale adopted for the meeting notes. Thus, our first analysis was to count the number of email exchanged between two direct communication events (F2F or teleconference).

As shown in Fig. 3, our preliminary evidences indicate periods of intense email exchange followed by period of relatively low interaction (min. 22, max. 182 emails, for periods of around 7 days).

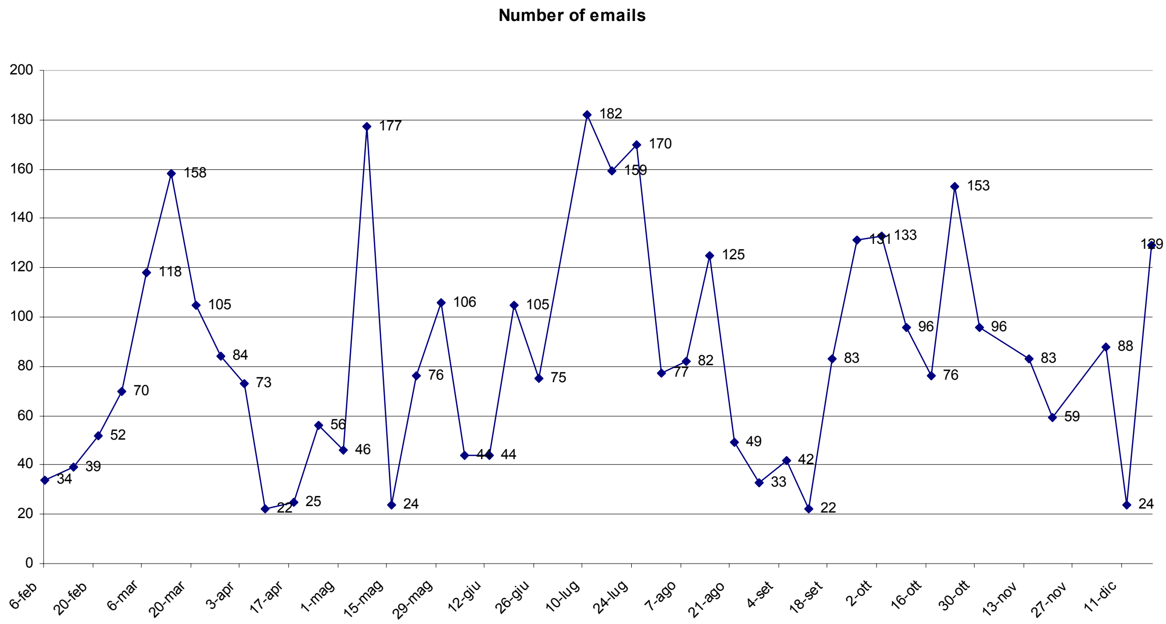

***Fig. 3.*** *Number of emails exchanged between February and December 2002.*

Comparing the email volumes and the number of text passages in teleconferences or in F2F meetings (Fig. 4) we can have a detailed representation of the communications between the different actors along the design phase.

A preliminary finding that emerges from this activity is that the two channels of communication (emails and teleconference/F2F) seem to be complementary. When direct communication is maximum (e.g. April 10th, June 13th, September 12th, November 14th), the email exchange drops off. Similarly, the picks in the email exchanges (7-14 March, 2-9 May, July, .etc) correspond to period without any meeting or teleconference.

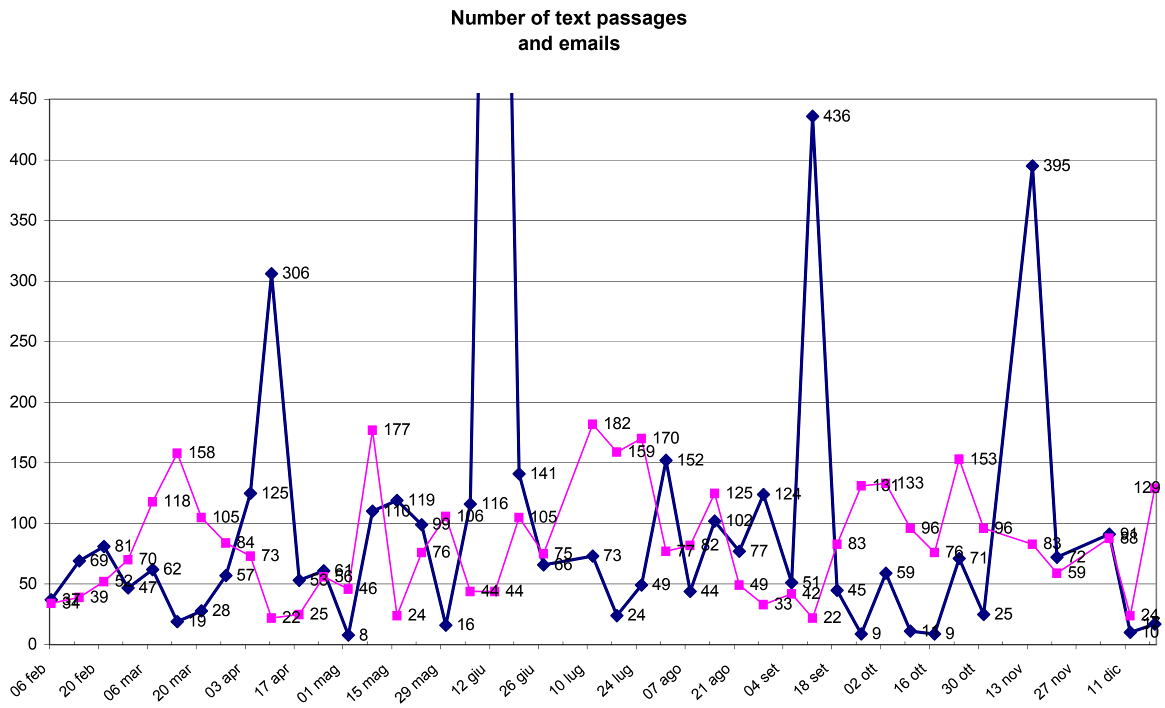


***Fig. 4.*** *Number of text passages (black) and emails (pink) exchanged in 2002.*

4) *Artefact analysis* - The subsequent analytical step has been the selection and the analysis of pilot episodes related to a specific part of the artefact. We selected the first five most relevant parts of the artefact in terms of volume of communications. The analysis about these components of the artefact is presented in section 5 and the design activities related to a specific part of the artefact (the "security" requirement) is described in section 5.1 based both on the F2F and teleconference meetings and on the exchanged emails.

### 4.2 Strategy and issues for further analysis

The author-based text labelling phase discussed above was useful to trace an overall picture of the data set. The subsequent steps would be: 1) drawing the social network; 2) exploring the relationship between the social network structure and the characteristics of the artefact. Both these steps present crucial methodological issue to be faced.

Social network analysis is often based on detecting and representing the number of direct communications (links) between actors (nodes). However, in our research domain, also the simple task of defining and representing direct communication presents intriguing problems. How do you consider a teleconference? Is it a discussion one-to-many or many-to-many? Is it enough to take part to the meeting to be considered a node of the network (any actor is exposed to all the messages exchanged in the teleconference) or is it better to require some form of active response to draw a network node? A discussion is often triggered by the intervention of one actor, with responses by one or several actors that may not be immediately and automatically connected to the original one. Methodologies for automatic detection of the network are under study (XXX 2009, removed for anonymity); in the meanwhile, a sensible option in the exploratory phase is to manually trace down the flux of conversation for selected episodes deciding on a case-by case basis.

Another relevant empirical issue is how to investigate the relationship between the characteristics of the artefact to the structure of the network. Which characteristics might be relevant? How to detect and measure them?

| Design activites: (3 2 1) - (3 2 2) | |
|---|---|
| (3 2 1) WSA goals-requirements | (3 2 2) Discussion on how to design WSA |
| (3 2 1 1) 03 goals 12-14 inclusion | (3 2 2 1) How to define design objectives |
| (3 2 1 2) 04 first reqrmts document | (3 2 2 1 1) focussing on what is needed |
| (3 2 1 3) 03 goal 1 ensure vs enable | (3 2 2 1 2) not focussing on present status |
| (3 2 1 4) 02 initial WSA goals gathering | (3 2 2 1 8) first approximation |
| (3 2 1 5) 03 goals 1-14 initial list | (3 2 2 2) Group responsibilities |
| (3 2 1 6) 06 assigning goal champions | (3 2 2 2 1) overall design - requirements coord |
| (3 2 1 7) 06 goal 1 assure too strong | (3 2 2 2 3) Recommendations to W3C |
| (3 2 1 8) 06 goal 5 simplicity | (3 2 2 2 3 4) for creating new groups if necessary |
| (3 2 1 9) 06 goal 6 security | (3 2 2 2 3 5) for activities to fill in gaps |
| (3 2 1 10) two req doc updates before april F2F | (3 2 2 2 4) Activities coordination in-out W3C |
| (3 2 1 11) 07 goals 1-3 | (3 2 2 2 5) Evangelization of Web services |
| (3 2 1 12) 07 goal 4 | (3 2 2 3) avoiding show-stoppers |
| (3 2 1 13) 07 goal 5 simplicity | (3 2 2 4) design the framework |
| (3 2 1 14) 07 goal 6 security | (3 2 2 5) do not design the solution |
| (3 2 1 15) 07 goals 7-16 | (3 2 2 6) find technology gaps |
| (3 2 1 16) 07 add new goals 17-19 | (3 2 2 7) do not design missing technologies |
| (3 2 1 17) 08 goal 7 | (3 2 2 8) Goals-use cases-requirements-CSF |
| (3 2 1 18) 08 goal 3 | (3 2 2 9) allowing change flexibility |
| (3 2 1 19) 08 goal 8 | (3 2 2 10) being minimalist to get consensus |
| … | (3 2 2 11) Critical Success Factor method |
| … | (3 2 2 11 1) CSF method discussed |
| (3 2 1 76) 32 final F2F cleanup | (3 2 2 11 10) CSF method temporarily |
| (3 2 1 77) 32 AC001 | (3 2 2 12) how to get closure on reqrmnts doc |
| (3 2 1 78) 32 AC2 6 8 11 16 17 19 AR 19 23 | (3 2 2 13) how to raise proposals from ballotin |
| (3 2 1 79) 32 new choreography goal | (3 2 2 14) how to finalize balloting |
| (3 2 1 80) 32 AR33 | (3 2 2 15) identify tasks and players |

***Fig. 5.*** *Hierarchical classification of design activities as related to the artefact – part 1.*

| Design activites: (3 2 3) - (3 2 12) | |
|---|---|
| (3 2 3) Definition of WSA | (3 2 9) WSA ARCH document |
| (3 2 3 1) what is WSA | (3 2 9 1) nominating editors |
| (3 2 3 2) trade-off stability growth | (3 2 9 2) F2F outline of arch |
| (3 2 3 3) intentional ambiguity | (3 2 9 3) F2F specifics go to the list |
| (3 2 3 6) needing requirements and framework | (3 2 9 4) Issue on URI addressing |
| (3 2 3 6 1) requirements | (3 2 9 5) harvesting |
| (3 2 3 6 2) framework | (3 2 9 5 1) SOAP vs REST proc model |
| (3 2 3 6 2 1) addressing how parts fit together | (3 2 9 5 5) what sources - code vs existing spec |
| (3 2 4) WSA issues list | (3 2 9 6) discussing if publishing |
| (3 2 4 1) Issues list document revision | (3 2 9 7) F2F32 arch doc discussion |
| (3 2 4 2) defining issues list content | (3 2 9 7 1) merging arch diagrams proposals |
| (3 2 4 3) reliable messaging | (3 2 9 8) F2F40 arch doc disc-revis |
| (3 2 5) WSA glossary | (3 2 9 9) Management Task Force |
| (3 2 5 1) What is a Web service | (3 2 9 9 1) HP pushing towards its interest |
| (3 2 5 2) F2F review glossary draft | (3 2 9 9 4) proposing Management Task Force |
| (3 2 7) WSA usage scenarios | (3 2 10) WSA vision_strategy |
| (3 2 7 1) forming a scenario task force | (3 2 10 1) WSA business visions |
| (3 2 7 2) scenarios draft doc editing | (3 2 10 1 1) extensible framework |
| (3 2 7 2 1) discussing terminology | (3 2 10 3) scenario strategy vs harvesting spec |
| (3 2 7 6) WSA use cases | (3 2 11) WSA extended - brainst F2F40 |
| (3 2 7 6 1) use cases vs scenarios | (3 2 12) First evaluation of impact |
| (3 2 7 6 2) use cases organization | |
| (3 2 7 6 3) use cases glossary | |
| (3 2 7 6 4) target audience | |
| (3 2 7 6 5) time horizon | |
| (3 2 7 6 6) use cases granularity | |
| (3 2 7 6 6 1) supporting different level use cases | |

***Fig. 6.*** *Hierarchical classification of design activities as related to the artefact – part 2.*

Figures 5 and 6 above show a classification of some the main activities of the design network as detected by the grounded theory analysis of the Telcon and F2F scripts.

We started our exploration by classifying the artefact (the WsA) and the related activities according to the most important architectural documents, one for each different type of deliverable to be issued by the design group.

The following parts were evidenced:

- ✓ The goals/requirements list (activities under code 3 2 1)
- ✓ The architectural document (activities under codes 3 2 3 and 3 2 9)
- ✓ The issues list (activities under code 3 2 4)
- ✓ The glossary document (activities under code 3 2 5)
- ✓ The usage scenarios (use case) document (activities under code 3 2 7).

Within each of these parts the hierarchy of sub-artefacts with the related activities is partially shown in the figures. The activities under code (3 2 2: *Discussion on how to design WSA*) are about the design method and can be refereed in general to all the parts above.

We are now investigating the differences and similarities on network structures that emerge around each object. We may expect to identify differences in the network structures according to differences in the designed outcome/artefact. At the same time we should notice a similar network structure for those objects that present similar characteristics.

# 5 DATA ANALYSIS AND DISCUSSION

The WsA design network under analysis in the selected sample period (between February and December 2002) consists of 66 persons belonging to 46 companies, collaborating for the design of the Web service Architecture standard in the W3C environment. According to our hypothesis we expect that (sub)networks with different structures may emerge according to the specific characteristics of the (sub)artefact under development.

Therefore, the attention is here focused on the (eventually) different sub-networks of WsA, each one working on a specific part of the artefact (i.e. architectural document, use cases, glossary, architectural requirements). We expect that similar artefacts will drive the emergence of similar network (both in its genesis and structure) and that objects that strongly differ for their characteristics will lead to different network dynamics and structures.

A preliminary analysis of the data set shows that the most active artefacts (those with a high number of communications between actors) present different network structures. We are able to report at this stage an exploratory matrix, accounting for the number of text passages attributed to each actor and relative to a specific category (Fig. 7). We select the first five artefacts for number of communications: artefact A (3.2.9.8 "*ARCH document\F2F40 arch doc disc-revis*"; 164 messages); B (3.2.152 "*goals-requirements\20 DAR 6_1-13 security*"; 160); C (3.2.9.9 "*ARCH document\Management Task Force*"; 147); D (3.2.1.43 "*goals-requirements\discussing reqrmnts doc voting res*"; 119); E (3.2.9.2 "*ARCH document\F2F outline of arch*"; 115).

| **Artefact/Actor** | ***3*** | ***5*** | ***8*** | ***11*** | ***13*** | ***16*** | ***17*** | ***18*** | ***19*** | ***21*** | ***22*** | ***30*** | ***32*** | ***33*** | ***41*** | ***43*** | ***51*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A (3.2.9.8)** | 7 | 0 | 10 | 10 | 23 | 1 | 20 | 0 | 3 | 13 | 3 | 0 | 0 | 0 | 1 | 0 | 21 |
| **B (3.2.1.52)** | 45 | 14 | 8 | 3 | 0 | 38 | 11 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 13 | 12 |
| **C (3.2.9.9)** | 18 | 0 | 4 | 6 | 7 | 9 | 12 | 0 | 7 | 18 | 6 | 0 | 0 | 0 | 10 | 3 | 22 |
| **D (3.2.1.43)** | 2 | 0 | 6 | 1 | 3 | 57 | 3 | 4 | 0 | 0 | 0 | 1 | 13 | 0 | 0 | 1 | 7 |
| **E (3.2.9.2)** | 27 | 2 | 3 | 2 | 10 | 8 | 8 | 0 | 0 | 9 | 0 | 0 | 20 | 17 | 0 | 1 | 0 |

***Fig.*** *7. Communication matrix of teleconference and F2F meetings. Columns report the actor codes; rows the artefact codes illustrated above in Figures 5-6. In each cell the number of text passages for each actor/artefact combination is shown.*

The sub-artefact codes (A, C, E), evidenced in grey, are part of the architectural document (code 3 2 9). The codes (B and D), evidenced in orange, are part of goals/requirements list (code 3 2 1).

The matrix cells report the text passages produced by each actor in reference with each object. The cell colours are lighter for lower volumes of communication, darker for higher volumes.

Actor #16 was very active for the artefacts B (28% of all the communication about the artefact) and D (48%) but he was less active for the other artefact (only 15% of his communication has focused on artefact A, C and E). Artefacts B and D seem to be driven by the activity of few persons compared with artefacts A, C and E. In details, if we consider the amount of communication between the most active actor for every artefact we have that they represent the 26% for A; 51% for B; 27% for C; 59% for D and 40% for E. So, the communication for artefacts B and D result to be much more concentrated than for the others.

## 5.1 Artefact analysis. 3.2.1.52 design task: security

As a further exploratory step, in this section we focus on a specific (sub)artefact. We selected the most relevant artefact for volume of communication (3.2.1.52 - the "*D-AG004 Security* requirement) and then we investigated all the direct communications (F2F, teleconference) or emails related to it. We will then try to replicate this analysis to different artefacts and than to compare these results in order to test our original hypothesis about the role of the network outcome in network genesis. Our hypothesis will be confirmed if similar artefacts present similar network structures and if different artefacts present different structures. Thus, this section will focus on *D-AG004 Security* artefact as a debated artefact inside the WsA distributed group.

*D-AG004 Security* is a specific part of the Web services Architecture Requirements (3.2.1.52), it ”addresses the security of Web services across distributed domains and platforms” and it “enables privacy protection for the consumer of a Web service across multiple domains and services”. During the sample period there have been 164 text passages in the minutes regarding this specific topic and several threads.

*Minutes* - Analyzing in details the minutes of the (physical and virtual) meetings, it emerges that few actors lead the discussion on the security requirement. In details, actor 13 is the most active (23 txt passages) followed by actor 91 (22); 51 (21), 17 (20) and 21 (13). Thus more than the half of the communications on the security requirement (86/164) is conducted by four actors. After them, there are three actors (8, 11 and 87), each with 10 passages and others with few communications. In total, only 16 actors participate in an active way to this discussion (around 24% of the group members). Considering the organization as level of analysis, W3C is leading the discussion with around 20% of the communication, followed by Sun (around 15%) and Thompson Corporation (14%). The group of interest composed by Microsoft, IBM and BEA does not often comment on this requirement (17 passages; around 10%). The security requirement appears to be immediately interesting for the group. In the first meeting (06 February 2002) there are 10 different members pointing at the security issue as a crucial requirement that should be designed. The second meeting (14 February 2002) has already the security as an issue in the agenda (point “e” and initially *AG006*) and in the first WsA Requirements Document (29 April 2002) the security is already well identified as *D-AG004 Security* and decomposed in two specific sub-parts (D-AC006 and D-AC020); this classification is the same of the final release of the WsA Requirements (11 February 2004).

*eMails* - In order to identify the relevant emails for this specific topic, we have investigated the mailing list repository for the period considered in this analysis (2002). As result for a searching with the keyword AG004 we have identified 69 mails. However in the initial period the “security” requirement have been identified with the tag AG006. Thus we have analyzed all the emails with either the keyword AG004 or AG006 in order to identify those in which the security topic was debated. Non pertinent emails selected by automatic search were manually spotted and removed.

At a preliminary view, the tendency to centralize the discussion of this requirement among few actors seems to emerge also in the mailing list. This finding is in line with similar results in different distributed context, as the open source development teams that seem to be founded on solo-work into a shared and collaborative environment.

# 6 PRELIMINARY CONCLUSIONS

Summing up the contribution, we can consider this paper as a first attempt to analyze a well known phenomenon (social networks) from a different perspective. We embraced this challenging path in order to avoid a limitation of the traditional perspectives that consider the network structure as exogenous and stable. Instead, in our perspective, we consider the reciprocal influence between the artefact and the social network structure, with a phase in which the desired artefact may shape the network genesis and a phase in which the emergent network’s structure may drive the artefact design.

These two phases may be iterative along a collaborative project life. Further investigation may uncover relevant patterns and factors of the process, advancing our knowledge of design networks and contributing to new methods and perspectives in social network analysis.

In conclusion, this article is illustrative, rather than confirmatory. It is desiderable to continue the study, moving forward to a deeper data analysis in which structural measures of the social network (cohesion, homogeneity, connectedness, centrality) will be conducted. Moreover the study should also take into consideration a more detailed literature review and the possible verlapping with other research steams, as collective actions or common resources.

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